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RESEARCH MEMORANDUM

EVALUATION OF GUST AND DRAFT VELOCITIES FROM FLIGHTS OF

P-61C AIRPLANES WITHIN THUNDERSTORMS

JULY 22, 1946 TO JULY 23, 1946

AT ORLANDO, FLORIDA

By

H. B. Tolefson

Langley Memorial Aeronautical Laboratory
Langley Field, Va.

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RESEARCH MEMORANDUM

EVALUATION OF GUST AND DRAFT VELOCITIES FROM FLIGHTS OF
P-61C AIRPLANES WITHIN THUNDERSTORMS

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The results obtained from measurements of gust and draft velocities within thunderstorms for the period July 22, 1946 to July 23, 1946 at Orlando, Florida, are presented herein. These data are summarized in tables I and II, respectively, and are of the type presented in reference 1 for previous flights.

Inspection of photo-observer records for the flights indicated that no data on ambient air temperature variations within thunderstorms were obtained.

Langley Memorial Aeronautical Laboratory
National Advisory Committee for Aeronautics
Langley Field, Va.

Harold B. Tolefson

Harold B. Tolefson
Aeronautical Engineer

Approved:

Richard V. Rhode

Richard V. Rhode
Chief of Aircraft Loads Division

CJB

REFERENCE

1. Tolefson, H. B.: Evaluation of Gust and Draft Velocities from Flights of P-61C Airplanes within Thunderstorms IV - July 19, 1946 to July 20, 1946 at Orlando, Florida. NACA RM No. L6J16b, 1946.

TABLE I.- SUMMARY OF GUST MEASUREMENTS FROM FLIGHTS
OF P-61C AIRPLANES WITHIN THUNDERSTORMS

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 347 Traverse 1		{ Time (EST) 144542 - 144815 Length of traverse 155.9 sec, 52,258 ft Initial heading (deg) 340						
0 - 3	26,000	5.3	-8.7	----	-----	----	----	5
3 - 6		2.2	-----	-----	-----	-----	-----	3
6 - 9		2.2	-3.4	5.6	-5.7	161	294	3
9 - 12		2.2	-3.4	-----	-----	-----	-----	2
12 - 15		3.4	-5.9	-----	-12.4	-----	233	6
15 - 18		6.6	-3.4	-----	-----	-----	-----	5
18 - 21		6.6	-5.6	-----	-----	-----	-----	5
21 - 24		5.6	-5.3	-----	-8.8	-----	175	8
24 - 27		3.4	-6.2	7.7	-----	102	-----	8
27 - 30		3.4	-2.8	-----	-7.5	-----	64	5
30 - 33		5.0	-9.4	27.2	-7.6	273	65	8
33 - 36		2.8	-8.4	-----	-18.1	-----	353	8
36 - 39		8.4	-5.0	18.6	-----	300	-----	5
39 - 42		2.8	-5.0	4.9	-----	67	-----	5
42 - 45	25,500	5.0	-6.6	13.2	-----	169	-----	6
45 - 48		5.0	-9.1	-----	-10.4	-----	69	10
48 - 51		9.4	-4.7	-----	-----	-----	-----	4
51 - 54		-----	-2.5	-----	-----	-----	-----	1
Airplane 347 Traverse 2		{ Time (EST) 144848 - 144955 Length of traverse 66.7 sec, 22,229 ft Initial heading (deg) 340						
0 - 3	26,000	6.2	-7.2	----	-----	----	----	3
3 - 6		9.3	-8.7	13.1	-7.6	33	67	7
6 - 9		2.2	-3.4	-----	-----	-----	-----	6
9 - 12		5.6	-5.6	-----	-----	-----	-----	8
12 - 15		2.2	-2.8	-----	-----	-----	-----	2
15 - 18		-----	-----	-----	-----	-----	-----	0
18 - 21		2.2	-2.2	-----	-----	-----	-----	2
21 - 24		-----	-----	-----	-----	-----	-----	0

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 10 ³	Pressure altitude (ft)	Maximum effective gust velocity U _{emax} (fps)		Maximum true gust velocity U _{tmax} (fps)		Gust gradient distance (ft)	No. of gusts	
July 22, 1946 - Flight 14								
Airplane 347 Traverse 3		{ Time (EST) 145125 - 145448 Length of traverse 218.1 sec, 73,551 ft Initial heading (deg) 340						
0 - 3	26,000	----	-3.1	----	-8.5	----	405	1
3 - 6		4.0	-3.4	----	-7.0	----	318	4
6 - 9		5.3	-4.7	----	-9.6	----	294	7
9 - 12		5.3	-6.2	20.1	----	286	----	3
12 - 15		6.8	-3.4	6.3	----	65	----	5
15 - 18		2.2	----	----	-4.4	----	196	4
18 - 21		7.5	----	----	----	----	----	2
21 - 24		3.7	-6.2	----	-19.5	----	506	3
24 - 27		7.1	-3.7	----	-21.5	----	454	5
27 - 30		----	-5.3	----	-14.2	----	461	2
30 - 33		4.0	-3.4	9.8	----	352	----	5
33 - 36		2.2	-3.4	5.8	----	33	----	4
36 - 39		7.1	-4.0	----	-6.9	----	131	5
39 - 42		5.3	-11.5	----	----	----	----	5
42 - 45		9.3	-6.5	----	----	----	----	4
45 - 48	9.3	-5.6	13.7	-11.5	71	109	7	
48 - 51	26,500	9.0	-7.1	----	----	----	6	
51 - 54		9.3	-10.6	14.9	----	76	----	4
54 - 57		4.4	-10.6	----	----	----	9	
57 - 60	27,000	9.9	-5.0	20.3	----	257	----	5
60 - 63		8.4	-6.8	----	----	----	11	
63 - 66	27,500	----	-7.1	----	----	----	3	
66 - 69		----	-7.5	----	----	----	3	
69 - 72		8.1	-5.3	----	----	----	2	
72 - 75		7.8	----	----	----	----	3	
Airplane 347 Traverse 4		{ Time (EST) - (a) Length of traverse 251.9 sec, 93,018 ft Initial heading (deg) - (a)						
0 - 3	26,000	4.1	-5.6	9.4	----	178	----	4
3 - 6		7.5	-5.0	----	----	----	----	7
6 - 9		13.0	-5.3	----	----	----	----	6
9 - 12		10.2	----	----	----	----	3	

^aNo records obtained.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)	Maximum true gust velocity $U_{t\max}$ (fps)	Gust gradient distance (ft)	No. of gusts		
July 22, 1946 - Flight 14							
Airplane 347 Traverse 4		{ Time (EST) - (a) Length of traverse 251.9 sec, 93,018 ft Initial heading (deg) - (a)					
12 - 15	26,000	8.7	-5.3	9.5	69	4	
15 - 18	26,500	12.7	-10.5	-----	-----	5	
18 - 21		10.5	-9.9	-----	-----	6	
21 - 24		8.3	-12.0	-----	-----	3	
24 - 27	27,000	11.7	-7.4	-----	-----	9	
27 - 30	27,500	6.8	-2.8	-----	-----	9	
30 - 33	28,000	17.3	-26.3	9.6	78	5	
33 - 36		13.3	-12.4	-----	-----	2	
36 - 39		2.2	-5.9	6.4	213	3	
39 - 42		9.0	-11.4	-----	-----	3	
42 - 45		1.9	-5.6	-12.1	369	4	
45 - 48		3.7	-----	-----	-----	2	
48 - 51	27,500	-----	-2.5	-7.4	388	1	
51 - 54		1.9	-3.7	4.9	38	4	
54 - 57		7.1	-2.8	-----	-----	6	
57 - 60		4.0	-4.3	-8.9	230	6	
60 - 63		3.4	-2.8	4.0	113	2	
63 - 66		1.9	-3.4	-----	-----	4	
66 - 69	27,000	4.6	-5.6	-6.5	112	6	
69 - 72		5.9	-4.6	-----	-----	2	
72 - 75		-----	-3.1	-----	-----	2	
75 - 78		3.1	-2.8	8.7	38	3	
78 - 81	26,500	4.3	-----	8.7	186	4	
81 - 84		5.3	-5.3	8.9	112	5	
84 - 87		4.0	-10.5	10.2	71	6	
87 - 90		3.4	-----	9.3	219	3	
90 - 93	26,000	4.9	-2.5	-----	-----	2	
93 - 96		-----	-----	-----	-----	0	
Airplane 347 Traverse 5		{ Time (EST) 151558 - 151936 Length of traverse 231.1 sec, 79,131 ft Initial heading (deg) 30					
0 - 3	26,000	8.0	-5.5	-----	-----	7	
3 - 6		4.9	-5.8	-----	-----	6	
6 - 9		5.2	-6.4	-----	-17.1	414	7

^aNo records obtained.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 347 Traverse 5		{ Time (EST) 151558 - 151936 Length of traverse 231.1 sec, 79,131 ft Initial heading (deg) 30						
9 - 12	26,000	6.7	-6.4	----	----	----	----	6
12 - 15		9.2	-5.5	19.2	-6.8	131	169	7
15 - 18		10.1	-8.0	----	-15.9	----	33	13
18 - 21		2.4	-6.4	----	----	----	----	4
21 - 24		4.0	-2.8	----	----	----	----	2
24 - 27		4.6	----	----	----	----	----	2
27 - 30		5.2	-11.6	----	----	----	----	9
30 - 33		5.2	-5.8	11.7	----	65	----	6
33 - 36		12.9	-5.5	----	----	----	----	6
36 - 39		12.9	-12.2	6.9	-8.7	69	36	6
39 - 42		8.0	-5.2	----	----	----	----	5
42 - 45	26,500	4.0	-6.1	8.8	----	75	----	5
45 - 48		9.8	-10.4	----	-6.9	----	74	8
48 - 51	27,000	9.5	-9.8	12.1	----	35	----	10
51 - 54		8.6	-5.8	----	-17.0	----	144	4
54 - 57	27,500	5.2	-11.0	----	----	----	----	4
57 - 60		11.9	-8.6	----	----	----	----	6
60 - 63		9.2	-6.4	----	----	----	----	3
63 - 66	28,000	10.1	-15.3	13.9	----	72	----	5
66 - 69		4.9	-6.4	----	-6.4	----	177	4
69 - 72		4.0	-6.1	----	----	----	----	3
72 - 75		4.9	-7.0	7.8	----	310	----	5
75 - 78	27,500	4.6	-6.1	----	----	----	----	5
78 - 81		4.6	-2.4	----	----	----	----	2
Airplane 333 Traverse 1		{ Time (EST) 143623 - (b) Length of traverse 538.6 sec, 179,818 ft Initial heading (deg) 270						
0 - 3	21,000	----	-2.5	----	----	----	----	1
3 - 6		----	-3.8	----	-5.9	----	126	2
6 - 9		2.2	-3.1	4.3	----	96	----	4
9 - 12		2.2	----	----	----	----	----	1
12 - 15		3.4	-3.8	----	----	----	----	2
15 - 18		5.0	-3.8	7.9	----	65	----	7
18 - 21		7.8	-3.8	14.0	----	158	----	8

^bRecords not obtained for complete traverse.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 333 Traverse 1		{ Time (EST) 143623 - (b) Length of traverse 538.6 sec, 179,818 ft Initial heading (deg) 270						
21 - 24	21,000	14.7	-9.4	----	----	----	----	10
24 - 27	21,500	10.3	-5.9	----	----	----	----	8
27 - 30		7.2	-4.7	14.2	----	137	----	9
30 - 33	22,000	3.8	-5.6	----	----	----	----	7
33 - 36		7.2	-8.4	----	----	----	----	5
36 - 39		6.6	-8.4	----	-8.2	----	34	5
39 - 42		4.7	-4.4	----	----	----	----	2
42 - 45		5.9	-2.2	9.1	----	105	----	2
45 - 48	21,500	3.4	-2.2	----	----	----	----	3
48 - 51		1.9	-2.8	----	----	----	----	4
51 - 54		1.9	----	----	----	----	----	2
54 - 57		----	-1.9	----	----	----	----	1
57 - 60		----	----	----	----	----	----	0
60 - 63		2.2	-2.5	4.7	----	135	----	4
63 - 66		1.9	----	----	----	----	----	2
66 - 69		1.9	----	4.9	----	307	----	2
69 - 72		----	-1.9	----	-6.0	----	34	2
72 - 75		1.9	-3.1	----	-5.9	----	137	4
75 - 78		2.5	----	3.7	----	104	----	2
78 - 81		----	----	----	----	----	----	0
81 - 84		----	----	----	----	----	----	0
84 - 87		----	----	----	----	----	----	0
87 - 90		----	----	----	----	----	----	0
90 - 93		----	----	----	----	----	----	0
93 - 96		1.9	-2.2	3.6	----	144	----	2
96 - 99		----	----	----	----	----	----	0
99 - 102	21,000	2.5	-2.8	----	----	----	----	6
102 - 105		1.9	-3.1	----	----	----	----	2
105 - 108		----	----	----	----	----	----	0
108 - 111		3.1	-3.1	7.4	----	34	----	4
111 - 114		1.9	-1.9	4.7	----	208	----	2
114 - 117		----	----	----	----	----	----	0
117 - 120		2.5	----	----	----	----	----	2
120 - 123		2.5	-2.5	----	----	----	----	2

^bRecords not obtained for complete traverse.

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity U_{max} (fps)		Maximum true gust velocity U_{tmax} (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 333 Traverse 1		{ Time (EST) 143623 - (b) Length of traverse 538.6 sec, 179,818 ft Initial heading (deg) 270						
123 - 126	21,000	----	-----	----	-----	----	-----	0
126 - 129		----	-----	----	-----	----	-----	0
129 - 132		----	-----	----	-----	----	-----	0
132 - 135		2.5	-1.9	----	-----	----	-----	2
135 - 138		----	-1.9	----	-----	----	-----	1
138 - 141		----	-----	----	-----	----	-----	0
141 - 144		----	-1.9	----	-3.6	----	132	1
144 - 147		2.5	-----	----	-----	----	-----	2
147 - 150		3.8	-----	----	-----	----	-----	2
150 - 153		----	-----	----	-----	----	-----	0
153 - 156		----	-3.4	----	-----	----	-----	1
156 - 159		----	-1.6	----	-----	----	-----	1
159 - 162		2.2	-4.1	----	-----	----	-----	6
162 - 165		2.8	-3.8	----	-----	----	-----	5
165 - 168	20,500	----	-----	----	-----	----	-----	0
168 - 171		3.8	-----	----	-----	----	-----	1
171 - 174		----	-----	----	-----	----	-----	0
174 - 177		3.1	-----	----	-----	----	-----	2
177 - 180		----	-2.5	----	-----	----	-----	1
Airplane 333 Traverse 2		{ Time (EST) 150144 - 150325 Length of traverse 177.5 sec, 58,845 ft Initial heading (deg) 360						
0 - 3	21,500	3.4	-----	----	-----	----	-----	3
3 - 6	21,000	4.9	-----	----	-----	----	-----	1
6 - 9		3.7	-3.1	----	-----	----	-----	4
9 - 12		2.5	-3.7	----	-----	----	-----	3
12 - 15		2.5	-2.5	----	-----	----	-----	2
15 - 18		4.3	-3.7	4.0	-----	131	----	6
18 - 21		7.7	-3.7	----	-----	----	-----	4
21 - 24		4.3	-9.5	----	-----	----	-----	12
24 - 27		7.1	-3.7	----	-----	----	-----	3
27 - 30		2.1	-3.1	----	-3.5	----	99	3
30 - 33		----	-3.1	----	-----	----	-----	2
33 - 36		8.0	-5.8	15.0	-----	100	----	9

^b Records not obtained for complete traverse.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)	Maximum true gust velocity $U_{t\max}$ (fps)	Gust gradient distance (ft)	No. of gusts
July 22, 1946 - Flight 14					
Airplane 333 { Time (EST) 150144 - 150325 Traverse 2 { Length of traverse 177.5 sec, 58,845 ft Initial heading (deg) 360					
36 - 39	21,000	7.7	-7.4	----	7
39 - 42	21,500	8.9	-8.0	----	7
42 - 45		7.1	-8.0	----	9
45 - 48		9.3	-5.2	---- -5.4	6
48 - 51	22,000	4.6	-4.3	----	8
51 - 54		4.6	-4.0	5.2 ----	5
54 - 57		2.8	-6.4	----	8
57 - 60		----	-1.8	----	1
Airplane 333 { Time (EST) 150616 - (b) Traverse 3 { Length of traverse 566.9 sec, 192,518 ft Initial heading (deg) 360					
0 - 3	21,500	2.4	-1.8	4.9 ----	2
3 - 6		1.8	-1.8	----	4
6 - 9		7.0	-13.8	---- -16.8	9
9 - 12		3.7	-3.1	---- -7.5	9
12 - 15		4.9	-3.1	----	6
15 - 18		3.7	-3.7	---- -7.8	3
18 - 21		----	-2.1	----	3
21 - 24		3.7	-3.7	---- -7.2	4
24 - 27		7.3	-3.7	----	5
27 - 30		8.3	-2.4	----	5
30 - 33	22,000	10.4	-13.8	----	9
33 - 36		6.7	-10.1	---- -19.9	5
36 - 39	22,500	4.9	-6.7	----	7
39 - 42		8.3	-11.0	----	8
42 - 45		7.6	-5.8	----	6
45 - 48		7.0	-9.2	----	5
48 - 51	23,000	11.0	-8.3	----	8
51 - 54		6.1	-8.9	----	7
54 - 57		4.9	-9.2	---- -13.7	6
57 - 60		11.3	-3.1	9.8 ----	4
60 - 63		7.0	-3.4	----	3
63 - 66		8.9	-8.3	----	5
66 - 69		11.3	----	14.0 ----	2

^bRecords not obtained for complete traverse.

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)	No. of gusts
July 22, 1946 - Flight 14							
Airplane 333 Traverse 3		{ Time (EST) 150616 - (b) Length of traverse 566.9 sec, 192,518 ft Initial heading (deg) 360					
69 - 72	23,000	6.4	-2.8	7.2	-----	148	3
72 - 75		6.4	-3.7	-----	-----	-----	3
75 - 78		6.1	-3.4	8.3	-----	183	3
78 - 81		3.4	-2.1	8.9	-----	181	4
81 - 84		6.1	-3.7	-----	-----	-----	4
84 - 87		13.8	-2.1	7.1	-----	73	5
87 - 90		4.3	-2.8	-----	-----	-----	5
90 - 93		6.4	-6.4	-----	-----	-----	5
93 - 96		4.6	-3.4	-----	-----	-----	5
96 - 99		4.0	-3.4	-----	-----	-----	7
99 - 102		8.6	-7.9	-----	-----	-----	6
102 - 105		8.9	-6.1	-----	-----	-----	6
105 - 108		9.5	-8.3	-----	-11.3	145	8
108 - 111		8.3	-13.1	-----	-----	-----	7
111 - 114		3.4	-5.2	4.7	-----	179	4
114 - 117		4.9	-2.4	-----	-----	-----	7
117 - 120	22,500	1.8	-----	-----	-----	-----	1
120 - 123		-----	-3.7	-----	-5.7	331	2
123 - 126	22,000	-----	-----	-----	-----	-----	0
126 - 129	21,500	-----	-----	-----	-----	-----	0
129 - 132		4.6	-----	-----	-----	-----	2
132 - 135	21,000	-----	-----	-----	-----	-----	0
135 - 138		-----	-----	-----	-----	-----	0
138 - 141		1.8	-1.8	-----	-----	-----	2
141 - 144		-----	-1.8	-----	-5.6	372	1
144 - 147	20,500	1.5	-----	-----	-----	-----	1
147 - 150		-----	-----	-----	-----	-----	0
150 - 153	20,000	2.8	-----	3.1	-----	443	1
153 - 156		-----	-----	-----	-----	-----	0
156 - 159		-----	-----	-----	-----	-----	0
159 - 162	20,500	-----	-2.1	-----	-----	-----	1
^b 162 - 165		-----	-----	-----	-----	-----	0

^bRecords not obtained for complete traverse.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)	No. of gusts	
July 22, 1946 - Flight 14								
Airplane 333 Traverse 4		{ Time (EST) 151508 - 151825 Length of traverse 173.8 sec, 50,391 ft Initial heading (deg) 250						
(c)								
Airplane 348 Traverse 1		{ Time (EST) - (d) Length of traverse 225.5 sec, 66,918 ft Initial heading (deg) 220						
0 - 3	15,500	8.2	-3.5	16.5	-----	478	----	2
3 - 6		1.6	-3.5	-----	-----	-----	-----	2
6 - 9		----	-5.7	-----	-----	-----	-----	2
9 - 12		3.5	-----	-----	-----	-----	-----	1
12 - 15		----	-4.1	-----	-----	-----	-----	1
15 - 18		2.8	-8.8	-----	-----	-----	-----	2
18 - 21		2.8	-3.5	6.4	-----	29	----	8
21 - 24		6.3	-5.7	12.0	-----	146	----	6
24 - 27		2.8	-5.4	4.8	-----	174	----	4
27 - 30		4.4	-6.9	-----	-----	-----	-----	7
30 - 33		2.8	-8.8	-----	-6.1	-----	145	4
33 - 36		5.0	-6.0	-----	-----	-----	-----	5
36 - 39		5.0	-3.5	-----	-----	-----	-----	3
39 - 42		6.0	-6.6	11.4	-----	293	----	8
42 - 45		4.1	-8.8	4.9	-----	31	----	7
45 - 48	16,000	8.5	-12.9	-----	-----	-----	-----	9
48 - 51		9.2	-9.2	-----	-----	-----	-----	9
51 - 54		6.0	-6.0	6.4	-----	30	----	6
54 - 57		5.4	-12.6	-----	-----	-----	-----	4
57 - 60		11.7	-7.9	-----	-----	-----	-----	13
60 - 63		7.3	-17.0	-----	-----	-----	-----	6
63 - 66		5.4	-4.7	-----	-----	-----	-----	4
66 - 69		----	-3.5	-----	-4.9	-----	120	1
Airplane 348 Traverse 2		{ Time (EST) - (a) Length of traverse 196.6 sec, 56,526 ft Initial heading (deg) - (a)						
0 - 3	15,500	----	-2.5	----	-5.5	----	251	1
3 - 6		6.9	-6.9	----	-----	-----	-----	7

^aNo records obtained.

^cNo records obtained due to lack of film.

^dClock not installed in airplane.

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TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 348 Traverse 2		{ Time (EST) - (a) Length of traverse 196.6 sec, 56,526 ft Initial heading (deg) - (a)						
6 - 9	15,500	11.3	-5.7	----	-----	----	----	8
9 - 12		4.4	-8.8	----	-8.0	----	87	5
12 - 15		12.9	-11.0	----	-----	----	----	7
15 - 18		10.4	-12.2	----	-----	----	----	4
18 - 21		-----	-6.3	----	-----	----	----	1
21 - 24		2.2	-3.5	----	-----	----	----	2
24 - 27		2.2	-----	----	-----	----	----	1
27 - 30		-----	-7.5	----	-----	----	----	2
30 - 33		15.1	-18.5	11.4	-----	58	----	8
33 - 36		8.2	-11.6	----	-----	----	----	6
36 - 39		2.8	-3.5	----	-----	----	----	3
39 - 42		1.6	-3.5	----	-6.7	----	112	7
42 - 45		2.5	-6.6	----	-----	----	----	4
45 - 48		8.8	-5.7	----	-----	----	----	4
48 - 51		11.9	-10.4	14.4	-----	25	----	8
51 - 54		3.1	-5.7	----	-----	----	----	4
54 - 57	-----	-3.8	----	-----	----	----	2	
Airplane 348 Traverse 3		{ Time (EST) - (a) Length of traverse 200.7 sec, 57,231 ft Initial heading (deg) - (a)						
0 - 3	15,500	8.8	-5.6	----	-7.4	----	55	2
3 - 6		3.1	-12.8	----	-----	----	----	4
6 - 9		3.1	-3.8	----	-----	----	----	2
9 - 12		3.1	-3.4	----	-----	----	----	2
12 - 15		7.5	-----	----	-----	----	----	1
15 - 18		5.0	-4.7	----	-----	----	----	3
18 - 21		5.0	-8.4	10.9	-----	176	----	4
21 - 24		2.8	-6.3	----	-----	----	----	5
24 - 27		1.6	-4.1	----	-----	----	----	4
27 - 30		4.4	-6.9	----	-----	----	----	2
30 - 33		4.4	-3.4	----	-----	----	----	2
33 - 36		6.6	-3.8	----	-7.4	----	57	3
36 - 39	1.3	-3.8	----	-----	----	----	2	

^aNo records obtained.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity U _{max} (fps)	Maximum true gust velocity U _{tmax} (fps)	Gust gradient distance (ft)	No. of gusts		
July 22, 1946 - Flight 14							
Airplane 348 Traverse 3		{ Time (EST) - (a) Length of traverse 200.7 sec, 57,231 ft Initial heading (deg) - (a)					
39 - 42	15,500	----	-6.6	----	----	1	
42 - 45		1.6	-3.8	----	55	2	
45 - 48		8.4	-3.4	6.1	285	3	
48 - 51		5.3	-5.9	----	----	7	
51 - 54		4.7	-6.6	14.1	136	10	
54 - 57		----	-5.6	----	----	3	
57 - 60		----	----	----	----	0	
Airplane 348 Traverse 4		{ Time (EST) - (d) Length of traverse 276.1 sec, 83,136 ft Initial heading (deg) 320					
0 - 3	15,500	----	-3.7	----	----	1	
3 - 6		2.8	-3.4	----	----	2	
6 - 9		----	-3.4	----	----	1	
9 - 12		----	-3.4	----	----	1	
12 - 15		3.4	----	4.0	86	1	
15 - 18		----	-3.4	----	-6.6	59	2
18 - 21		----	----	----	----	----	0
21 - 24	16,000	18.9	-14.6	----	----	7	
24 - 27		14.9	-7.7	15.2	125	7	
27 - 30		5.0	-6.8	7.0	150	5	
30 - 33		9.9	-20.4	----	----	8	
33 - 36		5.0	-6.5	----	----	4	
36 - 39		9.9	-4.3	----	----	6	
39 - 42		6.2	-12.4	----	-9.4	118	10
42 - 45		6.2	-6.5	----	----	----	8
45 - 48		7.7	-3.4	----	----	----	9
48 - 51		----	-3.4	----	----	----	1
51 - 54		2.2	-3.4	5.5	60	----	5
54 - 57		----	----	----	----	----	0
57 - 60		----	-3.4	----	----	----	2
60 - 63			3.4	-5.3	----	-6.2	90
63 - 66	15,500	2.8	-3.4	----	----	----	4
66 - 69		5.3	-3.4	----	----	----	4

^aNo records obtained.^dClock not installed in airplane.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity U_{max} (fps)	Maximum true gust velocity U_{tmax} (fps)	Gust gradient distance (ft)	No. of gusts
July 22, 1946 - Flight 14					
Airplane 348 Traverse 4		{ Time (EST) - (d) Length of traverse 276.1 sec, 83,136 ft Initial heading (deg) 320			
69 - 72	15,500	----	-4.0	----	1
72 - 75		2.5	-3.1	----	2
75 - 78		2.5	----	----	1
78 - 81		----	-3.4	----	1
81 - 84		----	----	----	0
Airplane 327 Traverse 1		{ Time (EST) 143307 - 143507 Length of traverse 122.2 sec, 36,147 ft Initial heading (deg) 230			
0 - 3	6,000	7.6	-----	----	1
3 - 6		3.8	-6.3	----	4
6 - 9		7.9	-9.2	17.7 -18.2	10
9 - 12		4.1	-5.7	5.2	6
12 - 15		4.1	-4.8	----- -9.9	2
15 - 18		4.4	-3.5	6.4	6
18 - 21		5.1	-7.6	----	5
21 - 24		----	-3.5	----- -3.9	2
24 - 27		----	----	----	0
27 - 30		1.6	-----	----	1
30 - 33		2.2	-4.1	3.7	3
33 - 36		2.5	-1.9	5.9	2
36 - 39		1.9	-----	----	1
Airplane 327 Traverse 2		{ Time (EST) 144429 - 144820 Length of traverse 240.6 sec, 73,882 ft Initial heading (deg) 190			
0 - 3	6,000	8.5	-2.5	----- -8.4	7
3 - 6	6,500	6.6	-6.9	----	9
6 - 9		2.8	-10.7	6.9 -12.6	10
9 - 12		3.8	-4.7	19.8 -10.9	7
12 - 15		4.1	-5.4	6.7 -6.5	6
15 - 18		12.3	-8.2	----	7
18 - 21		4.4	-4.4	8.5 -7.2	5
21 - 24		6.0	-6.6	----- -10.5	2
				----- 303	
				----- 91	
				----- 114	
				----- 173	
				----- 242	
				----- 180	

dClock not installed in airplane.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity U_{max} (fps)		Maximum true gust velocity U_{tmax} (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 327 Traverse 2		{ Time (EST) 144429 - 144820 Length of traverse 240.6 sec, 73,882 ft Initial heading (deg) 190						
24 - 27	6,500	6.9	-2.2	12.3	-----	360	-----	3
27 - 30	7,000	7.6	-6.6	6.3	-3.9	29	111	6
30 - 33		5.7	-8.8	7.4	-----	140	-----	4
33 - 36		-----	-2.8	-----	-----	-----	-----	1
36 - 39	6,500	10.1	-3.5	1.6	-3.5	188	122	6
39 - 42		6.3	-5.7	10.6	-----	96	-----	3
42 - 45		6.0	-3.5	10.1	-6.6	67	96	6
45 - 48		4.7	-4.1	-----	-----	-----	-----	4
48 - 51		9.5	-7.3	-----	-----	-----	-----	5
51 - 54		6.3	-7.6	-----	-14.1	-----	96	4
54 - 57	7,000	-----	-9.5	-----	-14.3	-----	283	2
57 - 60		2.8	-4.4	8.8	-4.4	224	111	4
60 - 63		7.2	-4.7	-----	-----	-----	-----	6
63 - 66		5.7	-9.5	-----	-----	-----	-----	7
66 - 69		6.9	-7.2	-----	-----	-----	-----	6
69 - 72		3.8	-6.0	-----	-----	-----	-----	3
72 - 75		9.8	-5.0	-----	-3.0	-----	191	2
Airplane 327 Traverse 3		{ Time (EST) 145500 - 145728 Length of traverse 161.8 sec, 47,236 ft Initial heading (deg) 290						
0 - 3	5,500	4.7	-4.7	4.3	-8.5	56	230	7
3 - 6		-----	-3.8	-----	-----	-----	-----	3
6 - 9		8.1	-7.2	-----	-----	-----	-----	3
9 - 12		3.1	-3.8	-----	-----	-----	-----	2
12 - 15		3.1	-4.7	-----	-2.5	-----	136	4
15 - 18		-----	-3.1	-----	-----	-----	-----	1
18 - 21		4.7	-----	4.9	-----	203	-----	3
21 - 24		-----	-----	-----	-----	-----	-----	0
24 - 27		-----	-----	-----	-----	-----	-----	0
27 - 30		-----	-4.4	-----	-7.8	-----	362	2
30 - 33		4.4	-----	-----	-----	-----	-----	2
33 - 36		2.2	-----	6.1	-----	245	-----	1
36 - 39		2.2	-----	-----	-----	-----	-----	1
39 - 42	6,000	-----	-3.8	-----	-4.7	-----	293	1
42 - 45		-----	-3.8	-----	-----	-----	-----	1
45 - 48		-----	-----	-----	-----	-----	-----	0

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity U_{max} (fps)		Maximum true gust velocity U_{tmax} (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 327 Traverse 4		{ Time (EST) 150637 - 150949 Length of traverse 204.7 sec, 65,228 ft Initial heading (deg) 230						
0 - 3	6,500	4.0	-4.0	9.7	-5.4	329	96	2
3 - 6		13.4	-8.4	7.3	-----	31	-----	4
6 - 9		7.2	-7.8	-----	-----	-----	-----	5
9 - 12		17.1	-8.1	-----	-----	-----	-----	10
12 - 15		5.3	-10.3	-----	-----	-----	-----	6
15 - 18		6.2	-4.7	-----	-----	-----	-----	5
18 - 21		7.2	-11.2	16.3	-12.7	234	147	8
21 - 24	7,000	16.5	-10.6	-----	-----	-----	-----	5
24 - 27		3.1	-8.1	-----	-15.8	-----	88	4
27 - 30		5.6	-2.2	7.5	-----	176	-----	3
30 - 33		6.9	-8.1	8.8	-9.4	148	178	6
33 - 36		10.3	-14.9	-----	-----	-----	-----	4
36 - 39		2.8	-7.8	-----	-----	-----	-----	5
39 - 42	6,500	9.0	-5.3	-----	-----	-----	-----	5
42 - 45		3.1	-2.5	-----	-----	-----	-----	2
45 - 48		2.5	-1.9	-----	-5.1	-----	252	2
48 - 51		-----	-3.7	-----	-----	-----	-----	3
51 - 54		6.2	-3.7	-----	-----	-----	-----	6
54 - 57		3.1	-3.7	4.9	-5.9	137	206	3
57 - 60	6,000	-----	-3.7	-----	-5.8	-----	105	2
60 - 63		2.5	-2.2	-----	-----	-----	-----	3
63 - 66		-----	-----	-----	-----	-----	-----	0
Airplane 327 Traverse 5		{ Time (EST) 151244 - 151515 Length of traverse 160.7 sec, 45,306 ft Initial heading (deg) 90						
0 - 3	5,500	6.5	-4.6	11.0	-4.4	122	116	3
3 - 6	6,000	4.0	-----	-----	-----	-----	-----	1
6 - 9		3.1	-3.7	-----	-----	-----	-----	3
9 - 12		4.6	-----	7.2	-----	142	-----	1
12 - 15		3.1	-4.6	-----	-----	-----	-----	2
15 - 18		2.5	-3.7	5.0	-----	222	-----	2
18 - 21		-----	-----	-----	-----	-----	-----	0
21 - 24		13.3	-10.5	25.2	-19.1	238	232	6

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 10 ³	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 22, 1946 - Flight 14								
Airplane 327 Traverse 5		{ Time (EST) 151244 - 151515 Length of traverse 160.7 sec, 45,306 ft Initial heading (deg) 90						
24 - 27	6,000	5.0	-5.0	6.8	-----	93	----	8
27 - 30		11.8	-7.4	19.8	-----	290	----	6
30 - 33		10.2	-6.2	-----	-----	-----	-----	6
33 - 36		8.7	-8.7	4.0	-15.0	85	83	7
36 - 39	6,500	10.2	-12.7	21.4	-12.9	78	98	5
39 - 42		4.6	-5.3	7.1	-----	25	----	5
42 - 45		3.4	-6.8	-----	-10.9	-----	26	5
45 - 48		-----	-----	-----	-----	-----	-----	0
July 23, 1946 - Flight 15								
Airplane 333 Traverse 1		{ Time (EST) 150503 - 150642 Length of traverse 53.8 sec, 20,430 ft Initial heading (deg) 350						
0 - 3	26,500	6.8	-6.2	-----	-----	-----	-----	4
3 - 6		-----	-10.9	-----	-----	-----	-----	2
6 - 9	26,000	11.8	-3.1	-----	-----	-----	-----	3
9 - 12		8.7	-9.9	-----	-----	-----	-----	5
12 - 15		4.4	-3.4	-----	-----	-----	-----	5
15 - 18		3.4	-9.0	-----	-12.2	-----	78	6
18 - 21		11.5	-5.6	-----	-11.5	-----	113	4
Airplane 333 Traverse 2		{ Time (EST) 151450 - 151642 Length of traverse 132.0 sec, 48,773 ft Initial heading (deg) 340						
0 - 3	26,500	-----	-6.5	-----	-----	-----	-----	3
3 - 6		7.7	-----	-----	-----	-----	-----	1
6 - 9		2.2	-6.5	-----	-----	-----	-----	3
9 - 12		-----	-3.7	-----	-----	-----	-----	1
12 - 15	26,000	10.5	-3.4	22.6	-----	419	-----	4
15 - 18	26,500	4.6	-5.6	5.5	-----	73	-----	4
18 - 21		4.3	-3.7	-----	-----	-----	-----	4
21 - 24		-----	-----	-----	-----	-----	-----	0
24 - 27		3.4	-4.0	11.3	-----	189	-----	3

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 23, 1946 - Flight 15								
Airplane 333 Traverse 2		{ Time (EST) 151450 - 151642 Length of traverse 132.0 sec, 48,773 ft Initial heading (deg) 340						
27 - 30	26,500	7.1	-3.4	----	-----	----	----	4
30 - 33		4.6	-3.4	----	-9.5	----	109	2
33 - 36		2.2	-9.0	----	-----	----	-----	4
36 - 39	26,000	7.1	-6.2	----	-----	----	-----	5
39 - 42		16.7	-7.1	----	-----	----	-----	3
42 - 45		13.9	-14.2	----	-----	----	-----	3
45 - 48		11.4	-5.3	----	-----	----	-----	4
48 - 51		4.3	-1.2	----	-----	----	-----	2
Airplane 333 Traverse 3		{ Time (EST) 152110 - 152224 Length of traverse 96.8 sec, 36,548 ft Initial heading (deg) 160						
0 - 3	26,000	----	-----	----	-----	----	----	0
3 - 6	26,500	10.2	-13.6	----	-----	----	-----	4
6 - 9	26,000	10.2	-5.9	----	-----	----	-----	4
9 - 12	26,500	7.1	-8.6	12.5	-----	192	-----	3
12 - 15		4.3	-1.8	----	-----	----	-----	3
15 - 18		----	-3.4	----	-10.6	----	269	1
18 - 21		4.6	-----	----	-----	----	-----	2
21 - 24		----	-6.2	----	-----	----	-----	1
24 - 27	26,000	4.6	-6.2	9.3	-----	146	-----	2
27 - 30		10.5	-6.2	----	-----	----	-----	5
30 - 33		7.4	-2.5	----	-----	----	-----	6
33 - 36		7.1	-9.9	----	-----	----	-----	3
36 - 39		----	-----	----	-----	----	-----	0
Airplane 333 Traverse 4		{ Time (EST) 152605 - 152917 Length of traverse 153.3 sec, 54,687 ft Initial heading (deg) 290						
0 - 3	26,000	2.8	-----	----	-----	----	-----	1
3 - 6		4.9	-6.8	----	-14.7	----	433	3
6 - 9		4.9	-----	----	-----	----	-----	1
9 - 12		4.6	-----	----	-----	----	-----	2
12 - 15		8.0	-5.8	----	-----	----	-----	3

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 23, 1946 - Flight 15								
Airplane 333 Traverse 4		{ Time (EST) 152605 - 152917 Length of traverse 153.3 sec, 54,687 ft Initial heading (deg) 290						
15 - 18	26,000	1.8	-3.7	----	-----	----	-----	3
18 - 21		4.9	-2.5	----	-----	----	-----	2
21 - 24		----	-3.7	----	-----	----	-----	2
24 - 27		7.1	-3.7	----	-----	----	-----	3
27 - 30		3.7	-3.4	----	-----	----	-----	4
30 - 33		----	-2.5	----	-----	----	-----	1
33 - 36		----	-1.8	----	-----	----	-----	1
36 - 39		3.1	-3.1	----	-----	----	-----	2
39 - 42		3.7	-6.1	----	-----	----	-----	3
42 - 45		4.9	-8.6	----	-----	----	-----	2
45 - 48		3.7	-5.5	----	-----	----	-----	2
48 - 51		9.5	-4.0	----	-----	----	-----	3
51 - 54	6.8	-8.6	----	-----	----	-----	3	
54 - 57	----	-----	----	-----	----	-----	0	
Airplane 333 Traverse 5		{ Time (EST) 154410 - 154528 Length of traverse 88.1 sec, 35,269 ft Initial heading (deg) - (e)						
0 - 3	26,000	3.0	-3.3	----	-----	----	-----	3
3 - 6		6.7	-6.1	----	-7.2	----	75	4
6 - 9		9.1	-----	----	-----	----	-----	1
9 - 12		4.6	-4.9	----	-----	----	-----	2
12 - 15		3.0	-7.8	----	-----	----	-----	4
15 - 18		6.7	-8.8	14.9	-----	275	-----	5
18 - 21		7.3	-5.2	----	-----	----	-----	3
21 - 24		3.9	-4.6	----	-----	----	-----	3
24 - 27		4.3	-6.7	----	-----	----	-----	5
27 - 30		7.6	-7.0	----	-----	----	-----	3
30 - 33		4.6	-3.3	----	-----	----	-----	2
33 - 36		1.8	-----	----	-----	----	-----	1

^aNot readable.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity U_{emax} (fps)	Maximum true gust velocity U_{tmax} (fps)	Gust gradient distance (ft)	No. of gusts
July 23, 1946 - Flight 15					
Airplane 327 Traverse 1 { Time (EST) 151203 - 151415 Length of traverse 147.4 sec, 56,500 ft Initial heading (deg) 360 }					
0 - 3	10,500	----	----	----	----
3 - 6		----	-3.4	----	-4.6
6 - 9		9.7	-8.1	----	-4.6
9 - 12	11,000	6.5	-6.9	----	----
12 - 15		12.8	-4.4	----	----
15 - 18		9.7	-13.1	----	-20.6
18 - 21		14.3	-11.5	----	----
21 - 24		8.7	-10.6	----	----
24 - 27		7.8	-3.7	----	----
27 - 30		11.2	-10.6	13.5	----
30 - 33		11.8	-8.7	----	----
33 - 36		9.3	-8.1	----	----
36 - 39		5.9	----	----	----
39 - 42		----	-2.8	----	----
42 - 45		----	-5.9	----	----
45 - 48		----	----	----	----
48 - 51		----	----	----	----
51 - 54		----	----	----	----
54 - 57		----	----	----	----
Airplane 327 Traverse 2 { Time (EST) 151935 - 152314 Length of traverse 238 sec, 87,167 ft Initial heading (deg) 180 }					
0 - 3	11,000	----	----	----	----
3 - 6		----	----	----	----
6 - 9		----	----	----	----
9 - 12		----	----	----	----
12 - 15	10,500	----	----	----	----
15 - 18		----	----	----	----
18 - 21		----	----	----	----
21 - 24		----	----	----	----
24 - 27		7.7	-4.0	----	----
27 - 30		5.0	-4.0	----	----
30 - 33		----	----	----	----
33 - 36		----	----	----	----

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)	Maximum true gust velocity $U_{t\max}$ (fps)	Gust gradient distance (ft)	No. of gusts
July 23, 1946 - Flight 15					
Airplane 327 Traverse 2 { Time (EST) 151935 - 152314 Length of traverse 238 sec, 87,167 ft Initial heading (deg) 180 }					
36 - 39	10,500	----	-----	----	0
39 - 42	11,000	10.2	-8.4	----	6
42 - 45		10.5	-4.3	----	2
45 - 48		5.3	-7.4	----	3
48 - 51		----	-4.3	-----6.0	2
51 - 54		----	----	----	0
54 - 57		5.0	-7.1	----	2
57 - 60		----	-5.0	----	2
60 - 63		----	----	-----4.2	1
63 - 66		----	5.2	-----183	1
66 - 69		----	----	----	0
69 - 72		----	----	----	0
72 - 75		----	----	-----4.2	1
75 - 78		----	----	----	0
78 - 81	10,500	----	----	----	0
81 - 84		----	----	----	0
84 - 87		----	----	----	0
Airplane 327 Traverse 3 { Time (EST) 153050 - 153214 Length of traverse 99.2 sec, 36,472 ft Initial heading (deg) 300 }					
0 - 3	11,000	4.6	-10.4	----	2
3 - 6		8.3	-4.9	-----3.1	4
6 - 9		9.8	-3.7	----	3
9 - 12		6.4	-8.3	----	5
12 - 15		8.0	-9.2	-----15.2	3
15 - 18		3.1	-4.6	----	5
18 - 21		----	----	----	0
21 - 24		----	----	----	0
24 - 27		----	----	----	0
27 - 30		----	----	----	0
30 - 33		----	----	----	0
33 - 36		----	----	----	0
36 - 39		----	----	----	0

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft $\times 10^3$	Pressure altitude (ft)	Maximum effective gust velocity U_{max} (fps)	Maximum true gust velocity U_{tmax} (fps)	Gust gradient distance (ft)	No. of gusts
July 23, 1946 - Flight 15					
Airplane 327 { Time (EST) 154245 - 154522 Traverse 4 { Length of traverse 175 sec, 64,479 ft Initial heading (deg) - (e)					
0 - 3	10,500	8.2	-7.6	----	3
3 - 6		2.7	-----	-----	2
6 - 9		5.8	-4.6	-----	4
9 - 12		-----	-----	-----	0
12 - 15		4.9	-3.1	-----	2
15 - 18		6.1	-3.7	-----	3
18 - 21		7.0	-7.9	-----	3
21 - 24		-----	-4.6	----- -7.6	1
24 - 27		-----	-----	-----	0
27 - 30		9.2	-9.5	-----	2
30 - 33		10.4	-4.9	-----	4
33 - 36		3.4	-9.2	-----	3
36 - 39		6.4	-5.2	-----	2
39 - 42		4.0	-4.6	-----	2
42 - 45		-----	-2.7	-----	1
45 - 48	11,000	-----	-4.0	-----	1
48 - 51		5.2	-----	-----	1
51 - 54		-----	-----	-----	0
54 - 57		-----	-----	-----	0
57 - 60		-----	-----	-----	0
60 - 63		-----	-----	-----	0
63 - 66		-----	-----	-----	0
Airplane 327 { Time (EST) 155035 - 155100 Traverse 5 { Length of traverse 36 sec, 13,221 ft Initial heading (deg) 195					
0 - 3	10,500	-----	-----	-----	0
3 - 6		-----	-----	-----	0
6 - 9		3.0	-----	4.0	1
9 - 12		-----	-----	7.2	1
Airplane 347 ^f					

^eNot readable.^fRecords indicate that recording instruments were in continuous operation for 30 minutes during climb, thus exhausting film supply before traverses were made.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 10 ³	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)	Maximum true gust velocity $U_{t\max}$ (fps)	Gust gradient distance (ft)	No. of gusts
July 23, 1946 - Flight 15					
Airplane 331 Traverse 1		Time (EST) 151450 - 151600 Length of traverse 87.8 sec, 25,388 ft Initial heading (deg) 350			
0 - 3	6,000	----	-2.5	----	2
3 - 6		3.1	-2.5	----	6
6 - 9		5.9	-5.6	----	7
9 - 12		5.3	-13.4	----	9
12 - 15		12.8	-6.9	----	4
15 - 18		5.6	-8.8	----	5
18 - 21	5,500	15.0	-7.2	24.1	9
21 - 24	6,000	3.1	-2.8	5.9	2
24 - 27		4.4	-----	-----	1
Airplane 331 Traverse 2		Time (EST) 152220 - 152505 Length of traverse 124.7 sec, 33,186 ft Initial heading (deg) 180			
0 - 3	5,500	6.2	-6.2	-----	10
3 - 6		9.6	-15.6	17.3	11
6 - 9		14.0	-12.8	-----	6
9 - 12		6.8	-3.1	11.9	3
12 - 15		4.4	-4.4	-----	7
15 - 18		-----	-3.1	-----	2
18 - 21		-----	-----	-----	0
21 - 24		-----	-2.8	-----	1
24 - 27		4.4	-3.4	-----	6
27 - 30	6,000	3.4	-3.4	5.3	10
30 - 33		-----	-4.4	-----	3
33 - 36		-----	-----	-----	0
Airplane 331 Traverse 3		Time (EST) 153105 - (e) Length of traverse 96.8 sec, 28,497 ft Initial heading (deg) - (e)			
0 - 3	6,000	6.2	-9.9	-----	10
3 - 6		3.1	-8.4	4.9	5
6 - 9		2.8	-5.3	-----	6
9 - 12		3.1	-3.7	6.0	6
12 - 15	5,500	5.6	-4.0	6.7	6

^e Not readable.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Continued

Space interval ft x 10 ³	Pressure altitude (ft)	Maximum effective gust velocity $U_{e\max}$ (fps)		Maximum true gust velocity $U_{t\max}$ (fps)		Gust gradient distance (ft)		No. of gusts
July 23, 1946 - Flight 15								
Airplane 331 Traverse 3		{ Time (EST) 153105 - (e) Length of traverse 96.8 sec, 28,497 ft Initial heading (deg) - (e)						
15 - 18	5,500	2.8	-3.7	8.4	-----	61	----	8
18 - 21		----	-2.8	----	-4.7	----	59	3
21 - 24		----	-2.8	----	-----	----	----	1
24 - 27		----	-2.8	----	-----	----	----	1
27 - 30		----	-----	----	-----	----	----	0
Airplane 331 Traverse 4		{ Time (EST) 153400 - 153620 Length of traverse 269.5 sec, 78,550 ft Initial heading (deg) - (e)						
0 - 3	5,500	7.4	-7.7	----	-8.3	----	117	12
3 - 6	6,000	5.3	-4.0	4.5	-----	90	----	9
6 - 9		6.5	-9.6	----	-4.6	----	28	7
9 - 12		3.7	-3.1	7.0	-----	26	----	8
12 - 15		3.4	-3.4	----	-----	----	----	3
15 - 18		5.9	-5.6	----	-5.4	----	53	7
18 - 21		3.1	-----	3.9	-----	110	----	2
21 - 24		2.5	-2.8	----	-----	----	----	3
24 - 27		3.1	-5.3	----	-----	----	----	5
27 - 30		2.5	-----	4.8	-----	141	----	1
30 - 33		2.5	-2.8	6.7	-----	29	----	4
33 - 36	5,500	4.0	-4.9	----	-----	----	----	6
36 - 39		3.4	-5.3	----	-7.8	----	31	11
39 - 42		13.9	-2.5	4.7	-10.7	276	312	6
42 - 45		11.1	-10.5	9.0	-----	213	----	8
45 - 48		4.6	-8.0	----	-----	----	----	9
48 - 51		2.8	-7.1	----	-----	----	----	8
51 - 54		2.8	-3.1	----	-----	----	----	5
54 - 57		2.8	-----	4.7	-----	61	----	4
57 - 60		2.8	-5.3	----	-----	----	----	3
60 - 63		4.9	-4.9	----	-----	----	----	12
63 - 66		3.4	-5.3	----	-----	----	----	7
66 - 69		7.7	-11.4	----	-----	----	----	10
69 - 72		4.9	-7.1	----	-----	----	----	7
72 - 75		3.7	-3.1	----	-----	----	----	6
75 - 78		----	-2.8	----	-----	----	----	2
78 - 81		----	-2.8	----	-----	----	----	2

eNot readable.

TABLE I.- SUMMARY OF GUST MEASUREMENTS - Concluded

Space interval ft x 103	Pressure altitude (ft)	Maximum effective gust velocity $U_{e_{max}}$ (fps)	Maximum true gust velocity $U_{t_{max}}$ (fps)	Gust gradient distance (ft)	No. of gusts
July 23, 1946 - Flight 15					
Airplane 331 Traverse 5		{ Time (EST) 154315 - 154606 Length of traverse 175.8 sec, 48,721 ft Initial heading (deg) 10			
0 - 3	5,500	8.6	-11.1	----	8
3 - 6		8.0	-2.5	3.9	10
6 - 9		7.1	-6.8	----	9
9 - 12	6,000	4.9	-9.5	----	10
12 - 15	5,500	3.4	-5.8	5.4	6
15 - 18		16.9	-7.1	----	6
18 - 21	6,000	9.5	-6.8	----	8
21 - 24		9.2	-2.8	----	9
24 - 27		----	----	----	0
27 - 30		3.4	-3.1	3.9	4
30 - 33		----	-3.1	----	1
33 - 36		3.4	-6.2	----	5
36 - 39		3.4	-3.1	----	4
39 - 42		5.8	-3.1	-4.8	158
42 - 45		3.1	-4.6	-5.0	80
45 - 48		2.8	-4.3	----	7
48 - 51		2.2	-----	----	1

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TABLE II.- SUMMARY OF DRAFT VELOCITY MEASUREMENTS FROM FLIGHTS
OF P-61C AIRPLANES WITHIN THUNDERSTORMS

Date	Flight no.	Air-plane no.	Assigned altitude (ft)	Tra-verse no.	Draft location from cloud entry (ft)		Draft extent (ft)	Average draft velocity (fps)
					Start	End		
7-22-46	14	347	26,000	1	23,053 31,813	25,886 48,280	2,833 16,467	26.8 -12.3
				^a 2				
				3	45,722	67,072	21,350	32.6
				4	16,173	32,096	15,923	54.8
				5	4,671 15,132 33,163	14,576 17,420 70,879	9,905 2,288 37,716	-7.8 34.3 20.3
		333	21,000	1	7,499 21,173	15,566 33,646	8,067 12,473	-9.5 33.0
				2	19,402	23,166	3,764	19.1
				3	26,104 86,445	52,104 96,271	26,000 9,826	25.6 24.8
				4	20,473	29,712	9,239	11.8
		348	16,000	1	11,229 36,627	16,104 56,634	4,875 20,007	13.9 7.0
				2	13,456	20,850	7,394	10.5
				^a 3				
				4	22,901	31,595	8,694	34.1
		327	6,000	^a 1				
				^a 2				
				^a 3				
				4	9,998	20,778	10,780	12.0
				5	28,672	42,344	13,672	20.9

^aNo draft velocities indicated by records.

TABLE II.- SUMMARY OF DRAFT VELOCITY MEASUREMENTS - Concluded

Date	Flight no.	Air-plane no.	Assigned altitude (ft)	Tra-verse no.	Draft location from cloud entry (ft)		Draft extent (ft)	Average draft velocity (fps)
					Start	End		
7-23-46	15	333	26,000	1	8,612	11,291	2,679	43.5
				2	14,498	22,395	7,897	14.9
					28,926	33,566	4,640	22.6
					35,533	42,100	6,567	-43.5
				3	10,685	22,441	11,756	-13.1
		327	11,000	4	29,621	44,577	14,956	10.8
				5	8,755	13,271	4,516	32.4
					13,271	19,075	5,804	-22.1
				1	14,531	26,827	12,296	16.8
				a ₂				
				a ₃				
				4	28,708	43,828	15,120	15.9
				a ₅				
		347 ^b	21,000					
		331	6,000	1	6,603	18,557	11,954	-18.8
				a ₂				
				a ₃				
				a ₄				
				5	6,563	10,719	4,156	23.8

^aNo draft velocities indicated by records.^bNo records obtained during traverses.

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